FINAL FIELD SAMPLING AND ANALYSIS REPORT
LONG LAKE - MITCHELL, ILLINOIS

BY:
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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
REGION 6 - FIELD OPERATIONS SECTION
BUREAU OF LAND
2009 MALL STREET
COLLINSVILLE, ILLINOIS 62234
JUNE 1999

Folder
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3.2 Sediment

A total of eight (8) sediment samples were taken during this sampling event. The sediment samples were labeled X101 through X108. The sediment samples were taken at the same locations as the surface water samples. Samples X107 and X106 were obtain from a boat using separate and clean stainless steel bucket augers. Samples X105 through X101 were taken by wading to the middle of the lake. The sample depth of the sediment samples was 0 - 10 inches. The samples were removed from the auger using separate and clean stainless steel scoops. Each sample was placed into 16-ounce glass jars. Sample X108 was obtained from on top of the culvert using a bucket auger on an extension pole.

The sediment samples were analyzed for pH, total organic carbon, phenols, mercury (total and TCLP), magnesium, arsenic (total and TCLP), antimony (total and TCLP), barium (total and TCLP), beryllium(total and TCLP), chromium (total and TCLP), cobalt, lead (total and TCLP), nickel (total and TCLP), silver (total and TCLP), thallium (total and TCLP), zinc, calcium, sodium, aluminum, boron, cadmium (total and TCLP), copper, iron, manganese, selenium (total and TCLP), strontium, vanadium (total and TCLP) and potassium.

3.3 Slag

A sample of the slag road was obtained during this sampling event. The sample was taken using a stainless steel scoop. Slag of various sizes was collected and placed in a 32-ounce glass jar. This sample was labeled X201. Sample X201 was analyzed for mercury (total and TCLP), magnesium, arsenic (total and TCLP), antimony (total and TCLP), barium (total and TCLP), beryllium(total and TCLP), chromium (total and TCLP), cobalt, lead (total and TCLP), nickel (total and TCLP), silver (total and TCLP), thallium (total and TCLP), zinc, calcium, sodium, aluminum, boron, cadmium (total and TCLP), copper, iron, manganese, selenium (total and TCLP), strontium, vanadium (total and TCLP) and potassium.

What appears to be secondary copper slag has been used to construct a road and a culvert system through Long Lake. Various sizes of slag, ranging from fines to boulders, was used as fill for this road. The slag extended into the lake and was in contact with the water.

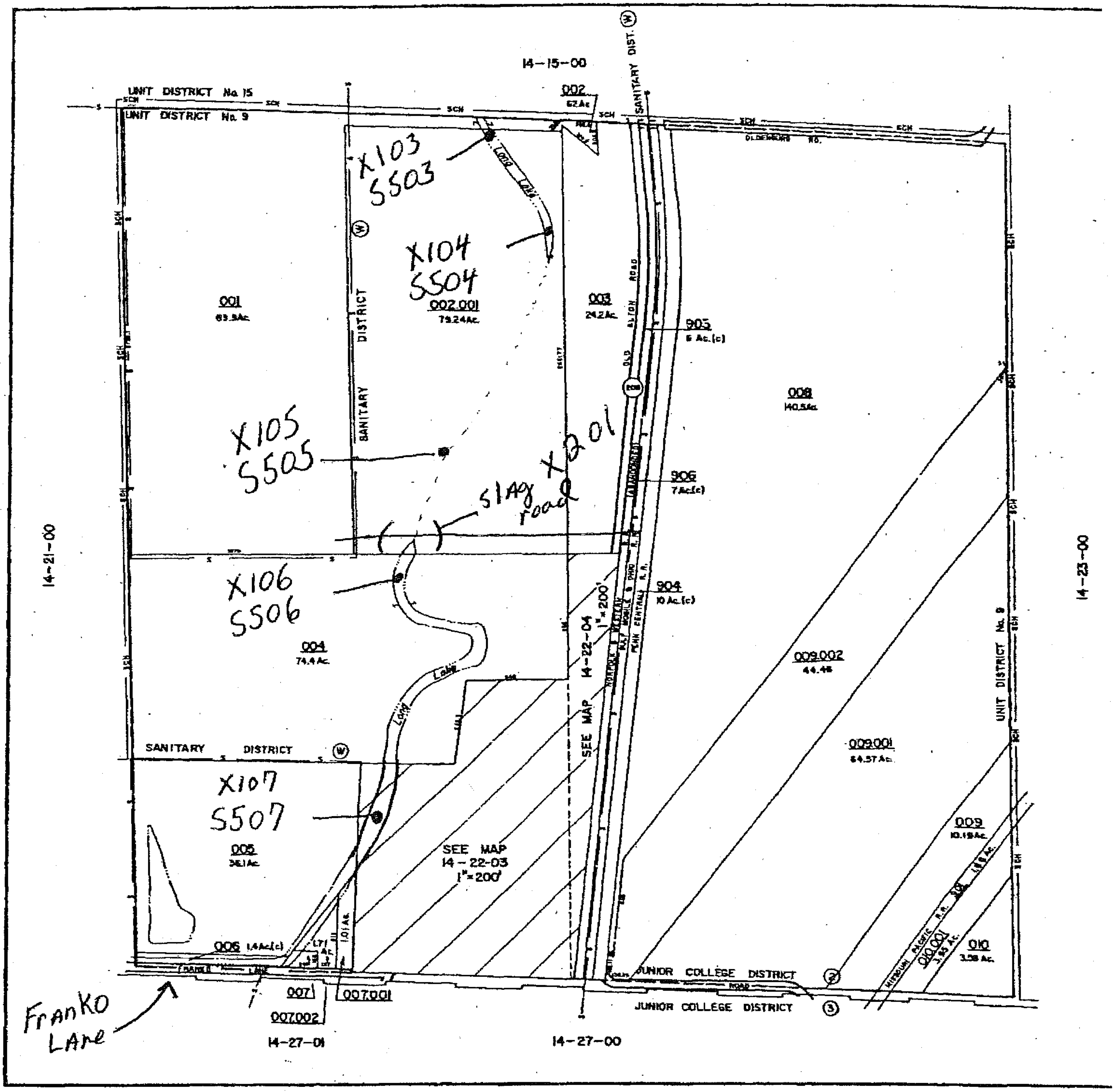
3.4 Sample Preservation

All surface water samples were preserved using nitric acid. The appropriate amount of nitric acid, about ten drops, was added to each sample to lower the pH to below 2.0. The samples were sealed with evidence tape and placed in an iced cooler for shipment to the laboratory.

TABLE 4.3.1
Slag Samples
Total and TCLP Metal Concentrations

	Total (mg/kg)	TCLP (mg/l)	TCLP Limits[1] (mg/l)
Aluminum	11,000	--	--
Barium	240	2.0	100.0
Beryllium	18	0.057	--
Boron	51	--	--
Cadmium	7.9	0.270	1.0
Calcium	19,000	--	--
Chromium	72	0.035	5.0
Cobalt	68	--	--
Copper	1,600	--	--
Iron	120,000	--	--
Lead	2,900	**14.0**	5.0
Magnesium	6,600	--	--
Manganese	1,400	--	--
Nickel	370	0.610	--
Potassium	1,400	--	--
Selenium	9.2	0.010K	1.0
Sodium	510	--	--
Strontium	45	--	--
Thallium	9.2	0.010K	--
Vanadium	32	0.005K	--
Zinc	34,000	--	--

II Title 35: Environmental Protection - Subtitle G: Waste Disposal - Chapter I: Pollution Control Board - Subpart C: Characteristics of Hazardous Waste - Section 721.124 Toxicity Characteristic



CHOUTEAU TOWNSHIP

MADISON COUNTY, ILLINOIS

LEGEND

SPECIAL DISTRICTS

CLT BALANCED GOVERNMENTAL SERVICES

REAL PROPERTY MAP
PREPARED FOR
MADISON COUNTY BOARD MEMBERS

DATE OF MAP: APRIL 23, 1973
DATE OF REVISION:
SCALE: 1"=400'

CONGRESSIONAL TOWNSHIP NO.

SECTION 22

TOWN 04 NORTH, RANGE 09 WEST

14-22-00
MAP NUMBER

Figure 4-3

DLPC/FOS [illegible]fied Sample Document

Laboratory: Champaign Springfield

Page 2 of 2

LP41 | 119000 200 | MAdison | Mitchell/L[illegible] Lake

Section [14] F

USEPA # N/A

Site Name [19] Mitchell / Long Lake

Project Manager's Name and Mailing Address: Chris Cahnovsky

Section/Unit: BOL/FOS Collinsville

IL 6

IEPA Laboratory Address and Phone Number (circle one)

2125 S. 1st Street Champaign, IL 61820, 217/333-6907

825 N. Rutledge Street Springfield, IL 62702, 217/782-9780

Phone # 618/346 5120

Case # (if applicable)

Delivered by [23]

Parameter Group [03] & Other Analytes | Collection Information

Lab Sample # [01]	SWAST	SWAST TCLP	[12] Split "2" is yes	SAVE (y/n)	# Bottles	[15] Field Sample #	[20] Date Collected & Sealed	[21] Time Collected (24 hr clk)	Time Sealed (24 hr clk)	[22] Sampler's Initials	[24] Special Notations	Seal Intact (y/n)
B903265	X		N	N	1	X101	3/16/99	11:25	14:35	CNC	Total Metals w/	
B903266	X		N	N	1	X102	3/16/99	11:00	14:35	CNC	Zinc & Copper	
B903267	X		N	N	1	X103	3/16/99	10:25	14:35	CNC	"	
B903268	X		N	N	1	X104	3/16/99	10:05	14:35	CNC	"	
B903269	X		N	N	1	X105	3/16/99	9:50	14:35	CNC	"	
B903270	X		N	N	1	X106	3/15/99	11:00	15:30	CNC	"	
B903271	X		N	N	1	X107	3/15/99	10:45	15:30	CNC	"	
B903272	X		N	N	1	X108	3/16/99	11:45	14:35	CNC	"	
B903273		X	N	N	1	X201	3/15/99	11:10	15:30	CNC	TCLP metals	

Return Results to Chris Cahnovsky 618/346-5120

Receipt for Samples: Collection of the above-listed sample(s) at the indicated site is hereby acknowledged.

Split(s) Offered? y / n Accepted? y / n

Signature/Title of Facility Representative, Date

Samplers (printed names and signatures)

Chris Cahnovsky [signature]

Mike Grant [signature]

Sealer: I certify that the samples listed above were sealed by me and I wrote my initials, the date, and the time on the seal(s).

Sealer's Signature & Initials: [signature] CNC Date: 3/16/99 Time (24 hr clk): 14:35

Carriers: I certify that I received the container(s) holding the above sample(s) with the seal(s) intact and the sealer's initials and sealing date written on the seal(s).

Relinquished by (Sealer): [signature] Date: 3/16/99 Time (24 hr clk): 14:45 Received by: UPS Date: 3/16/99 Time (24 hr clk): 14:45

MAR 17 1999

To Sealed Container for Shipment

Laboratory Custodian: I certify that I received the container holding the above sample(s) with the seal integrity as indicated above and the sealer's initials and the date written on the seal(s). After being received, this/these same sample(s) will be retained by laboratory personnel at all times or locked in a secured area.

Printed Name, Signature, and Initials [07] Date [05] Time [06] (24 hr clk)

Supervisor releasing results (signature): Date:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

SAMPLE NUMBER : B903273
SAMPLING POINT DESC. : MITCHELL LONG LAKE, MADISON CNTY

SUBMITTING SOURCE # : 1190000000 SITE # : X201
DATE COLLECTED : 990315 TIME COLLECTED : 1110 SAMPLING PROGRAM :

COLLECTED BY : CNC DELIVERED BY : UPS
COMMENTS :
FUNDING CODE : LP41 AGENCY ROUTING : 00 UNIT CODE :
SAM TYPE CODE : SAMPLE PURPOSE CODE : F REPORTING INDICATOR : B

DATE RECEIVED : 990317 TIME RECEIVED : 0900 RECEIVED BY : LPD
LAB OBSERVATIONS : TRIP BL SAM# :
SUPERVISORS INITIALS : SMM NOTE : K = LESS THAN VALUE

A10000 PH,FINAL TCLP EXT	UNITS :	4.8	P79693 PHENOLS,SW846	MG/KG :	0.51K
P79595 CYANIDE,SW84 D/WT	MG/KG :	0.51K	P81951 CARBON,ORG(TOC)	MG/KG :	21000
P70318 SOLIDS,% WET SAMPL	% :	98.54	P49134 MERCURY,TCLP SLD	MG/L :	0.001(
P99023 MERCURY,SW84 D/WT	MG/KG :	0.10K	P49100 ANTIMONY,TCLP SLD	MG/L :	.006K
P49099 ARSENIC,TCLP SLD	MG/L :	.010K	P49101 BARIUM,TCLP SLD	MG/L :	2.0
P49102 BERYLLIUM,TCLP SLD	MG/L :	.057	P49103 CADMIUM,TCLP SLD	MG/L :	.270
P49105 CHROMIUM,TCLP SLD	MG/L :	.035	P49109 LEAD,TCLP SLD	MG/L :	14.
P49112 NICKEL,TCLP SLD	MG/L :	.610	P49114 SELENIUM,TCLP SLD	MG/L :	.010K
P49115 SILVER,TCLP SLD	MG/L :	.005K	P49118 THALLIUM,TCLP SLD	MG/L :	.010K
P49119 VANADIUM,TCLP SLD	MG/L :	.005K	P79581 CALCIUM,SW84 D/WT	MG/KG :	19000
ˋ79650 MAGNESIUM,SW D/WT	MG/KG :	6600	P79705 SODIUM,SW846 D/WT	MG/KG :	510
,00937 POTASSIUM,SW D/WT	MG/KG :	1400	P97545 ALUMINUM,SW8 D/WT	MG/KG :	11000
P79547 ANTIMONY,SW8 D/WT	MG/KG :	5.5K	P79548 ARSENIC,SW84 D/WT	MG/KG :	9.2K
P79550 BARIUM,SW846 D/WT	MG/KG :	240	P78463 BORON,SW846 D/WT	MG/KG :	51
P79556 BERYLLIUM,SW D/WT	MG/KG :	18	P79580 CADMIUM,SW84 D/WT	MG/KG :	7.9
P79591 CHROMIUM,SW8 D/WT	MG/KG :	72	P79594 COPPER,SW846 D/WT	MG/KG :	1600
P79593 COBALT,SW846 D/WT	MG/KG :	68	P79645 IRON,SW846 D/WT	MG/KG :	12000(
P79649 LEAD,SW846 D/WT	MG/KG :	2900	P79651 MANGANESE,SW D/WT	MG/KG :	1400
P79671 NICKEL,SW846 D/WT	MG/KG :	370	P79703 SELENIUM,SW8 D/WT	MG/KG :	9.2K
P79704 SILVER,SW846 D/WT	MG/KG :	4.6K	P79706 STRONTIUM,SW D/WT	MG/KG :	45
P79712 THALLIUM,SW8 D/WT	MG/KG :	9.2K	P79722 VANADIUM,SW8 D/WT	MG/KG :	32
P79726 ZINC,SW846 D/WT	MG/KG :	34000			

DISPOSITION DOCUMENT

FOR

HISTORICAL SLAG AT

CHEMETCO, INC.

October 2001

Chemetco, Inc.

1.0 Introduction

The purpose of this document is to facilitate the agreement between the parties on remedial alternatives for the slag present on site. While regulatory issues are discussed, the focus of this document is to compile existing environmental information and to outline potential remedies.

The Chemetco facility was constructed in 1969 and commenced production of anode copper, cathode copper, crude lead-tin solder, zinc oxide and slag in 1970. The Chemetco facility is located directly within an agricultural area within a larger industrial corridor along Route 3. The facility is bounded on the west by a major, heavily traveled rail and highway routes and on the south by a limited use secondary road. Chemetco's operations are conducted on an approximately 40 acre secured area within the approximately 240-acre site. The acreage is located in the Southeast ¼, Section 16, Township 4 North, Range 9 West of the Third Principal Meridian, in Madison County.

2.0 Background on Slag

Chemetco generates an iron-silicate slag. Historical slag on-site consists of approximately 300,000 cubic yards. The cooled slag is a hard, dense and inert material produced in the secondary copper smelting process. As explained below, Chemetco in 1987 changed its method of handling the molten slag, thus changing the physical characteristics (primarily size) of the solidified material.

Prior to 1987, molten slag was produced in and poured from the top blown rotary converters (TBRC), or furnaces, into a slag pot that was then hauled from the production area to slag cooling pits on the southern face of the present slag pile. The molten material was poured from the Kress slag hauler into one of the four cooling pits whereupon it slowly cooled and solidified. The solidified slag was then broken up as necessary and added to the slag pile. This process produced what has been called "chunky slag". Chunky slag varies in size from sand grains to as much as four inches across or larger.

Beginning in September 1987, Chemetco initiated a modified process which features rapid cooling of molten slag by pouring a narrow stream of molten slag into a high pressure, ambient temperature water spray to produce granulated slag. The granulated slag is run through the Granulated Slag Screening Plant and shipped out for use as granules on asphalt shingles.

2.1 Generation

Prior to March 29, 1991, the slag produced by Chemetco was not a characteristic hazardous waste. EP toxicity results for Chemetco slag were statistically less than the characteristic regulatory standards. Slag produced by Chemetco prior to March 29, 1991 never had the designation of "RCRA hazardous waste." Markets for Chemetco slag include shingle manufacturing, cement production, concrete aggregate, and use as road base material.

Slag generated after March 29, 1991 has been analyzed using the TCLP method. Lead and cadmium levels in the slag exceed the TC regulatory levels. Thus if the slag generated after March 29, 1991 is to be disposed, it must be disposed as a RCRA hazardous waste. If the slag is recycled, it does not meet the definition of hazardous waste. The parties disagree regarding what acts constitute disposal in this context.

Given the usage and placement history of the slag at the Site, it is estimated that greater than 90% of the slag in the pile is pre-March 1991 slag.

2.2. Composition

In the past several years the historical slag has been subjected to leach testing using three (3) different tests; TCLP, SPLP, and distilled water. This section will summarize the data from the tests.

SPLP and TCLP

USEPA was on-site in May of 1998 to collect samples of various materials and wastes at Chemetco. The facility split samples for a few of the materials. The split samples of slag taken during the May 1998 USEPA sampling event were analyzed by Chemetco utilizing the SPLP method. The analytical results supplied by USEPA for the TCLP analysis and the corresponding SPLP analytical results are included below in Table 2-1.

Table 2-1
Comparison of TCLP/SPLP Results of Slag

Sample No.	Pb TCLP (mg/L)	Pb SPLP (mg/L)
SL-001	18.4	0.894
SL-002	16.6	1.04
SL-003	11.8	0.550
SL-004	15.4	2.28
SL-005	20.5	1.59
SL-006	39.2	1.39
SL-007	56.6	1.62
SL-008	14.6	1.51
SL-009	79.9	2.07
SL-010	27.7	1.18
SL-011	54.4	1.61
SL-012	17.2	0.556
SL-013	43.9	1.88

SL-014	50.6	1.45
SL-015	56.0	1.19
SL-016	21.0	0.440
SL-017	38.2	1.25
SL-018	67.7	3.01
SL-019	37.8	0.869
SL-020	17.0	0.751

(It should be noted that a majority of the 20 samples were of the finer fraction of the slag residing in the pile in the northeast corner of the facility. Chemetco contends the samples are not representative of the slag pile as a whole.)

The orders of magnitude of difference between TCLP and SPLP analytical data led Chemetco to perform additional testing on slag as described below.

Statistical comparisons of lead determination using TCLP and SPLP, in combination with the chemical assay techniques identified as Method 200.8 and Method 6010, analyses were conducted. Those comparisons are supported by the use of an appropriately statistically designed sampling plan.

The statistical design required the collection of three slag samples from a road surface. The object of the investigation was to determine the effect of slag sample leaching and assay procedures on the resulting concentration of leachable lead. Therefore, these samples were taken from convenient road surface locations. Reasonable care was exercised to obtain samples of the slag used in road construction and avoid other road construction material.

The collected sample containing "large" pieces of slag were comminuted with a hammer to reduce any "chunks" to a size amendable to hand mixing. The comminuted sample material was then mixed as well as possible by hand and four roughly equal size aliquots extracted. Each aliquot weighed at least 100 grams to permit application of the appropriate leach extraction procedure.

Each aliquot was assigned a combination of leaching and lead assay procedure as indicated in the following table (Table 2-2). The assignment of each aliquot to procedure combination was performed at random. The resulting statistical design is referred to as "two factor factorial in randomized complete blocks." The "blocks" are the three physical samples collected from the road.

Table 2-2
Sample Aliquot Procedure Assignment

Combination	Leach Procedure	Assay Procedure
A	Method 1311	Method 6010
B	Method 1311	Method 200.8
C	Method 1312	Method 6010
D	Method 1312	Method 200.8

Although it was not a part of the initial design, the laboratory performed replicate assays for six of the submitted samples. All replicates were for assay Method 200.8, with three being associated with each leaching technique. This provided an unanticipated estimate of the variation associated with the assay method. Comparing this estimate to the "experimental error" from the resulting Analysis of Variance (ANOVA) revealed that the experimental error was not significantly different from the variation associated with the assay technique. Analytical data is included in Table 2-3

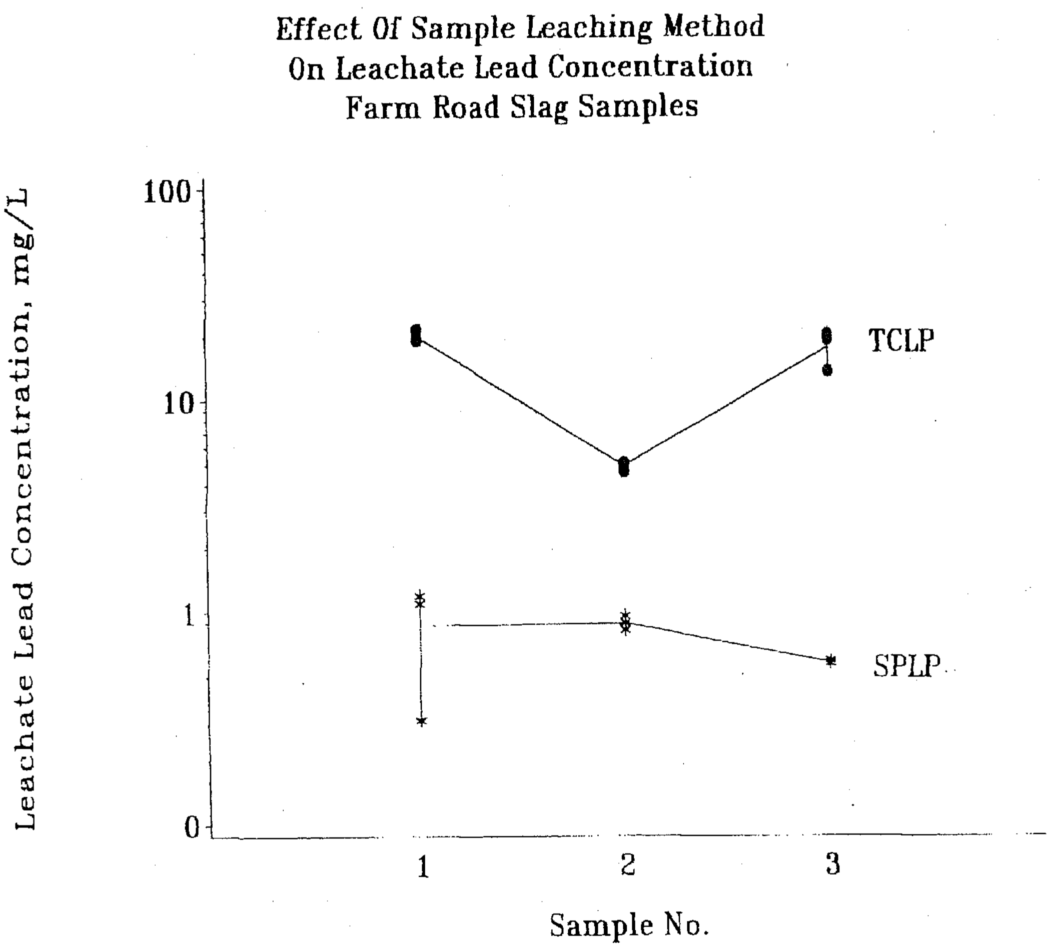
Table 2-3
Analytical Data From Slag Road

Sample ID	TCLP Pb 200.8	TCLP Pb 6010B	SPLP Pb 200.8	SPLP Pb 6010B
01-110899[1]	19.4	19.5		
04-110899[1]			0.311	
07-110899[1]			1.20	1.10
10-110899[1]	21.6			
02-110899[2]	5.04	4.60		
05-110899[2]			0.961	0.890
08-110899[2]			0.822	
11-110899[2]	5.02			
03-110899[3]	13.6			
06-110899[3]			0.573	
09-110899[3]			0.593	0.570
12-110899[3]	19.2	20.3		

[1]Sample location 1
[2]Sample location 2
[3]Sample location 3

Statistical analysis of the data using ANOVA of the resulting data indicated that only the different leaching procedures produced statistically significant differences in lead concentration. This statistical significance is illustrated in the Figure 2-1. Note that a logarithmic scale is employed on the vertical axis of this figure. Thus, the differences between using the TCLP and SPLP procedures are order of magnitude differences in leachate lead concentration. The variation due to other sources is illustrated in this figure as Hi-Lo plots about the sample-leach procedure mean.

Figure 2-1
Statistical Significance of leach Method



Because leaching Fluid 1 was used for each of the leaching techniques, the pH of the fluids used is fairly constant (TCLP, 4.9 and SPLP, 4.2). Logically, one is lead to attribute the differences to the type of acid used for leaching, the organic acid used for TCLP versus the inorganic acid used for SPLP. Chemetco intends to propose remedial alternatives for the slag that eliminates the prospect that the slag would ever be placed in an untreated or unaltered condition where it would commingle with municipal waste. Thus, the SPLP procedure becomes available to the Parties in making remedial decisions.

Distilled Water

Slag has been shown to produce a buffering effect in some cases such and during an evaluation of the slag for construction projects in the late 1980's, long term testing was conducted on eleven samples, each sample lasting 28 to 30 days during which distilled water was circulated continuously through 55-gallon polyethylene drums of slag material.

In order to obtain samples for testing Chemetco excavated representative material from slag storage pile and placed the samples in new 55-gallon drums. Each drum and its contents had an average total weight of approximately 850 pounds.

Each drum was then transported to the sample preparation area. The contents of each drum were screened for separation into the following five size fractions: greater than 3"; less than 3" but greater than 1 ½"; less than 1 ½" but greater than ¾"; less than ¾" but greater than 3/8"; and less than 3/8". After separation into size fractions through screening, each resulting size fraction was weighed, and this weight was recorded.

From the contents of each drum a 100 pound representative sample was prepared by blending material from each of the size fractions in the same proportion as existed in the full drum sample. Each resulting 100-pound sample was placed in a large polyethylene bag, sealed and transported to the laboratory.

At the laboratory, three samples were initially selected for testing. Each sample was emptied into a clean 55-gallon polyethylene drum. Forty-five gallons of distilled water was added to each drum, and the drum was covered with a polyethylene drum cover. Distilled water was circulated continuously through he drums at an average rate of 2-1/2 gallons per minute. At 7-day intervals a sample of the liquid was drawn for analysis for lead and cadmium. The total testing period for each sample lasted 28 days. The results of the test are shown in Attachment 1.

After the first three samples were tested, the procedure was modified. In the modified procedure, liquid samples were taken each hour of the first 10 hours and then once each day for the next nine days. Further liquid samples were taken 10 and 20 days later. Testing of additional samples conducted following modification of the sampling procedure. In addition to analyzing liquid samples for lead and cadmium, the modified procedure included recording pH and temperature levels. The results of the later testing are also shown in Attachment 1. The distilled water leaching tests continued for a total of 58 days- 28 for the first phase and 30 for the second.

Table 3-3 Long Term Water Leach Test Results

CHEMETCO INC
HARTFORD , IL
SLAG / DISTILLED WATER LEACH TEST

DATE	TIME INTERVAL	TIME UNIT	LEAD (PPM)	CADMIUM (PPM)	TEMP (oC)	PH
			SAMPLE	NO. 12		
OCT13	7	DAY	0.522	0.083		
	14	DAY	0.587	0.084		
	21	DAY	0.341	0.081		
	28	DAY	0.242	0.012		
	AVERAGE		0.423	0.065		
	DEVIATION		0.138005	0.030618		
			SAMPLE	NO. 3		
OCT13	7	DAY	0.01	0.005		
	14	DAY	0.01	0.005		
	21	DAY	0.611	0.126		6.01
	28	DAY	0.284	0.005		6.29
	AVERAGE		0.22875	0.03525		
	DEVIATION		0.247422	0.052394		
			SAMPLE	NO. 18		
OCT13	7	DAY	0.229	0.025		
	14	DAY	0.602	0.022		
	21	DAY	0.848	0.021		7.28
	28	DAY	0.847	0.005		7.29
	AVERAGE		0.6315	0.01825		
	DEVIATION		0.253075	0.007790		
			SAMPLE	NO. 1		
NOV19	915	HOUR	0.467	0.779	18	7.1
	1015	HOUR	0.482	0.09	18	7.05
	1115	HOUR	0.382	0.061	18	7.1
	1215	HOUR	0.226	0.206	18.5	7
	1315	HOUR	0.938	0.09	19	7.1
	1415	HOUR	0.579	0.285	20	7
	1515	HOUR	0.374	0.005	20	7.05
	1615	HOUR	0.331	0.119	20	7.1
	1715	HOUR	0.656	0.072	21	7.05
	1815	HOUR	0.396	0.054	21	7.15
	1915	HOUR	0.334	0.054	22	7.1
NOV20	915	HOUR	1	0.005	24.5	7.8
NOV21	915	HOUR	0.369	0.11	26	7.1
NOV22	915	HOUR	0.204	0.143	20	7.85
NOV23	915	HOUR	0.126	0.131	23	8.25
NOV24	915	HOUR	0.151	0.046	24.75	7.15
NOV25	915	HOUR	0.444	0.107	24.5	7.15
NOV26	915	HOUR	0.285	0.052	23.4	7.15
NOV27	915	HOUR	0.574	0.008	23.5	6.8

Table 3-3 (cont'd)

NOV28	915	HOUR	0.244	0.111	23.5	7.15
DEC08	920	HOUR	0.805	0.077	31	7.25
DEC18	915	HOUR	0.128	0.079	29	7.3
AVERAGE			0.431590	0.122		7.215909
DEVIATION			0.239404	0.156486		

SAMPLE NO. 22

	915	HOUR	0.105	0.005	18	7.8
NOV19	1015	HOUR	1.28	0.036	18.5	8.45
	1115	HOUR	2.32	0.005	18.5	8.35
	1215	HOUR	1.4	0.014	19.5	8.45
	1315	HOUR	3.96	0.182	20	8.55
	1415	HOUR	1.04	0.005	20	8.45
	1515	HOUR	3.97	0.049	21	8.5
	1615	HOUR	2.39	0.014	21	8.55
	1715	HOUR	1.47	0.005	21	8.55
	1815	HOUR	1.79	0.005	21	8.55
	1915	HOUR	1.95	0.012	21	8.65
NOV20	915	HOUR	1.52	0.005	27	8.65
NOV21	915	HOUR	1.23	0.11	29	9
NOV22	915	HOUR	0.522	0.02	22	10.15
NOV23	915	HOUR	0.452	0.005	25	9.7
NOV24	915	HOUR	0.484	0.098	25.75	9.55
NOV25	915	HOUR	0.551	0.028	25	9.53
NOV26	915	HOUR	0.808	0.011	22.5	9.75
NOV27	915	HOUR	0.911	0.048	24.5	9.45
NOV28	915	HOUR	0.432	0.087	24.5	9.35
DEC08	920	HOUR	1.01	0.092	21	8.35
DEC18	915	HOUR	0.313	0.027	24	8.05
AVERAGE			1.359454	0.039227		8.835454
DEVIATION			1.030498	0.045603		

SAMPLE NO. 30

	915	HOUR	0.158	0.005	18	7.3
NOV19	1015	HOUR	0.222	0.047	18	7.5
	1115	HOUR	0.415	0.082	20	7.45
	1215	HOUR	0.545	0.037	20	7.55
	1315	HOUR	0.673	0.005	21	7.6
	1415	HOUR	0.548	0.072	21	7.75
	1515	HOUR	0.739	0.082	22	7.5
	1615	HOUR	0.7	0.091	22	8.35
	1715	HOUR	0.119	0.005	21	8.15
	1815	HOUR	0.54	0.024	21.5	8.35
	1915	HOUR	0.551	0.036	24	8.05
NOV20	915	HOUR	0.482	0.005	29	7.85
NOV21	915	HOUR	0.414	0.029	30	8.6
NOV22	915	HOUR	0.464	0.092	21	8.9
NOV23	915	HOUR	0.417	0.075	28	8.25
NOV24	915	HOUR	0.32	0.036	29.5	8.5
NOV25	915	HOUR	0.405	0.028	30	8.25
NOV26	915	HOUR	0.362	0.005	29	8.5
NOV27	915	HOUR	0.484	0.005	29	8.05
NOV28	915	HOUR	0.287	0.052	30.25	7.8

Table 3-3 (cont'd)

DEC08	920	HOUR	0.825	0.193	27	8.05
DEC18	915	HOUR	0.195	0.052	28	6.95
	AVERAGE		0.448409	0.048090		7.965909
	DEVIATION		0.183935	0.043327		

SAMPLE NO. 17

JAN08	900	HOUR	0.914	0.081	18	9.7
	1000	HOUR	0.379	0.01	18	9.35
	1100	HOUR	0.335	0.005	18	9.85
	1200	HOUR	0.363	0.005	18	9.8
	1300	HOUR	0.322	0.044	18	9.85
	1400	HOUR	1.8	0.022	18	9.85
	1500	HOUR	0.714	0.022	20	9.9
	1600	HOUR	0.587	0.053	20	9.85
	1700	HOUR	0.288	0.005	20	9.85
	1800	HOUR	0.247	0.005	20	9.85
	1900	HOUR	0.461	0.005	20	9.85
JAN09	900	DAY	0.195	0.005	19	9.85
JAN10	900		0.249	0.032	26	9.9
JAN11			0.233	0.005	22	9.9
JAN12			0.432	0.07	29	10.05
JAN13			0.405	0.117	29.5	9.95
JAN14			0.507	0.005	30	9.9
JAN15			0.074	0.005	30	9.95
JAN16			0.45	0.005	28	10.15
JAN17			0.379	0.042	29	10.2
JAN18			0.339	0.005	30	10.45
JAN28			0.505	0.005	26	6.45
FEB08			0.444	0.005	23	6.75
	AVERAGE		0.461826	0.024260		9.617391
	DEVIATION		0.333150	0.029882		

SAMPLE NO. 8

JAN08	900	HOUR	1.06	0.005	18	9.5
	1000	HOUR	2.73	0.076	18	9.85
	1100	HOUR	2.35	0.024	18	10
	1200	HOUR	2.09	0.005	18	10
	1300	HOUR	1.31	0.005	19	10.05
	1400	HOUR	1.55	0.005	19	10.1
	1500	HOUR	1.61	0.005	20	10.05
	1600	HOUR	0.04	0.005	20	9.95
	1700	HOUR	2.84	0.005	20	9.95
	1800	HOUR	1.25	0.052	20	10.05
	1900	HOUR	1.41	0.005	20	10.1
JAN09	900	DAY	1.19	0.005	19	9.95
JAN10			2.49	0.037	26	10.15
JAN11			1.99	0.005	24	10.1
JAN12			4.43	0.299	29	10
JAN13			1.09	0.005	29.5	10
JAN14			1.99	0.085	30	10
JAN15			1.78	0.005	30	10
JAN16					28	10.2
JAN17			0.974	0.023	29	10.25
JAN18			1.39	0.015	30	10.55

Table 3-3 (cont'd)

JAN28				1.5	0.019	25	6.65
FEB08				0.583	0.005	24	7
	AVERAGE			1.711227	0.031590		9.758695
	DEVIATION			0.888346	0.062717		
				SAMPLE	NO. 20		
JAN08		900	HOUR	1.27	0.191	18	9.4
		1000	HOUR	1.13	0.012	18	9.85
		1100	HOUR	1.2	0.005	18	10.05
		1200	HOUR	1.49	0.005	18	10.1
		1300	HOUR	1.14	0.052	19	10.05
		1400	HOUR	0.995	0.051	19	10.15
		1500	HOUR	0.302	0.005	19	10.05
		1600	HOUR	0.435	0.025	20	10.05
		1700	HOUR	0.447	0.005	20	10
		1800	HOUR	0.621	0.005	20	10.05
		1900	HOUR	0.605	0.027	20	10.05
JAN09			DAY	0.316	0.028	19	10.15
JAN10				0.414	0.005	26	10.1
JAN11				0.316	0.005	24	10.05
JAN12				0.522	0.005	29	9.95
JAN13				0.938	0.005	29.5	10.05
JAN14				0.397	0.005	30	10.05
JAN15				0.444	0.005	30	10.15
JAN16				0.112	0.042	28	10.25
JAN17				0.379	0.075	29	10.3
JAN18				0.302	0.005	30	10.6
JAN28				0.59	0.032	25	6.65
FEB08				0.621	0.047	21	6.85
	AVERAGE			0.651565	0.027913		9.780434
	DEVIATION			0.371037	0.040146		
				SAMPLE	NO. 16		
JAN21		800	HOUR	0.672	0.03	17	7.4
JAN21		900	HOUR	0.711	0.005	17	7.45
JAN21		1000	HOUR	0.45	0.098	18	7.5
JAN21		1100	HOUR	0.896	0.015	19	7.45
JAN21		1200	HOUR	1.83	0.005	19	7.5
JAN21		1300	HOUR	0.461	0.005	19	8.35
JAN21		1400	HOUR	0.562	0.012	18	8.75
JAN21		1500	HOUR	0.656	0.005	18	8.85
JAN21		1600	HOUR	0.552	0.04	18	8.9
JAN21		1700	HOUR	0.708	0.112	19	8.7
JAN21		1800	HOUR	0.593	0.005	20	8.5
JAN22			DAY	1.26	0.03	29	8
JAN23			DAY	0.724	0.005	24	7.85
JAN24			DAY	0.476	0.032	29	7.55
JAN25			DAY	1.49	0.005	20	7.6
JAN26			DAY	0.593	0.047	24	7.5
JAN27			DAY	0.549	0.058	19	7.55
JAN28			DAY				
JAN29			DAY				
JAN30			DAY	0.432	0.06	22	6.7
FEB07			DAY	0.42	0.049	21	6.75
FEB17			DAY	0.924	0.005	22	7.8
	AVERAGE			0.74795	0.03115		7.8325

Table 3-3 (cont'd)

	DEVIATION		0.365195	0.031071		
			SAMPLE	NO. 2		
JAN21	800	HOUR	0.297	0.042	17	7.85
JAN21	900	HOUR	0.914	0.005	17	7.85
JAN21	1000	HOUR	0.01	0.005	18	8.35
JAN21	1100	HOUR	0.184	0.005	19	8.4
JAN21	1200	HOUR	0.203	0.005	19	8.7
JAN21	1300	HOUR	0.97	0.055	18	8.8
JAN21	1400	HOUR	0.522	0.064	18	8.9
JAN21	1500	HOUR	0.328	0.115	18	8.9
JAN21	1600	HOUR	0.447	0.017	17	8.5
JAN21	1700	HOUR	0.774	0.067	18	8.1
JAN21	1800	HOUR	0.095	0.005	19	8.05
JAN22		DAY	0.227	0.005	26	7.9
JAN23		DAY	0.342	0.005	22	7.8
JAN24		DAY	0.54	0.005	25	7.65
JAN25		DAY	0.214	0.095	20	7.55
JAN26		DAY	0.336	0.039	23	7.55
JAN27		DAY	0.01	0.051	24	7.6
JAN28		DAY				
JAN29		DAY				
JAN30		DAY	1.29	0.005	26	6.7
FEB07		DAY	0.977	0.063	22	7.25
FEB17		DAY	1.51	0.005	20	7.45
	AVERAGE		0.5095	0.0329		7.9925
	DEVIATION		0.415539	0.033619		

Ronald Yarbrough, Geologist, for the Bankruptcy Estate of Chemetco

17 July 2002

FACT JUSTIFICATION FOR SALE OF AIR-COOLED IRON/SILICATE SLAG AT FORMER CHEMETCO PLANT

Introduction

The former Chemetco, Inc. constructed a secondary copper smelter south of Hartford, IL in 1970. The company declared Chapter 7 bankruptcy on 31 October 2001 and the plant assets, debts and some environmental legacies passed to the creditors and the bankruptcy Trustee. The company was a major producer of recycled copper and crude tin/lead solder from low-grade scrap materials. The company also produced two industrial by-products--a zinc oxide rich sludge from the air cleaning scrubbers and bag-houses and an iron/silicate slag. At first, it appears that the company made little effort to sell the scrubber sludge, containing zinc, copper, lead and tin and the iron/silicate slag, which contains minor amounts of copper oxides, copper metal, lead carbonate hydroxide, tin oxide and other trace metals. In the 1980's the company made an effort to sell these smelting by-products, with some success. Iron/silicate slag was crushed for railroad ballast, concrete aggregate and as a "sandwich" between tar and chips on local roads to reduce frost heave and to lower operation and maintenance cost. The slag was also utilized by the Illinois Department of Transportation as a base for bridge abutments and slope stability. But, Chemetco also produced more than they sold.

When EPA regulations required the by-products to be tested for potential leaching of hazardous metals (such as lead), the by-products passed the EP Tox leaching test until EPA introduced the Toxicity Characteristic Leaching Procedure (TCLP) in 1991. The TCLP procedure is important in sanitary landfills, for leaching of municipal garbage, as the dominant leaching agent is acetic acid, an organic acid, which is produced within the landfill. Iron/silicate slag contains no carbon content and the Trustee's processing contractor and the buyer are not planning to mix the slag with organic trash. TCLP test was important to determine the potential for leachate, from the garbage, much of which is organic material, to pollute the groundwater resource. The iron/silicate slag failed the TCLP test for lead and on a few occasions, cadmium. EPA noted that the pre-1987 air-cooled ("chunky") slag (1,000,000+- tons) exhibited hazardous leaching potential for lead and sometimes cadmium metals and the pre-1987 slag was speculatively accumulated and thus discouraged the selling of the material.

In the early 1990's the company found a market for the slag for roofing shingles. They changed their means of dealing with the by-product slag as it was moved from the furnaces. Company staff poured the hot fluid slag into a high-pressure water spray that quick cooled the material. This produced a more easily crushable product, which was glassy with fines (called a frit). The material was crushed, dried and screened for correct particle size (See Appendix A). The iron/silicate slag, with copper oxide as a minor constituent, was sold for roofing shingle backing (the heavy slag, encapsulated in asphalt on the back of the shingle). The slag reduced wind lifting and the minor amounts of

3-2

Rain Leach Tests

CHEMETCO INC
SLAG
SIMULATED "ACID RAIN" LEACH TEST

DESIG-NATION	T=6HR PH	T=6HR TEMP	T=7HR PH	T=7HR TEMP	T=8HR PH	T=8HR TEMP	T=9HR PH	T=9HR TEMP	T=10HR PH	T=10HR TEMP	T = 54HR LEAD	T = 54HR CROMIUM	DESIG-NATION
118	15	16	4.4	16.5	3.6	16.5	3.7	17	4.38	16	4	0	118
128	65	16.5	4	16.5	3.5	15	3.55	17	3.64	17	2.63	0.015	128
138	75	16	9.45	17	10.45	17	10.25	17	10.3	17	0.288	0.063	138
148	35	16	9.2	17	10.1	17	9.98	17	10.04	17	0.18	0	148
158	25	16	9.15	16.5	10	17	9.9	16.5	11.49	17	0.277	0.025	158
168	35	16	9.25	16.5	10.3	16.5	10.2	16.5	10.51	17	0.235	0.037	168
178	.4	15.5	9.35	16.5	10.45	16.5	10.35	17	10.42	17	0.205	0.099	178
188	55	16	9.55	16.5	10.9	17	10.85	17	10.85	17	0.058	0.032	188
218	85	16.5	5.2	16.5	4.7	17	5.2	17	5	17	1.46	0	218
228	.9	16	4.7	16.5	4.46	16.5	4.6	16.5	5.05	17	1.84	0.02	228
238	45	16	6.05	16.5	6.95	17	6.9	16.5	6.59	17	0.381	0.021	238
248	.1	16	6.8	16.5	8.65	17	8.5	17	8.18	17	0.332	0.013	248
258	.2	16.5	7.7	16.5	9.4	16.5	8.97	16.5	8.8	17	0.373	0	258
2[illegible]	.4	16	8.1	16.5	9.15	16.5	9.05	16.5	8.92	17	0.355	0	268
2	15	16	8.25	16.5	9.2	17	9.1	17	9.04	17	0.376	0.113	278
28[illegible]	35	16.5	8.35	17	9.35	17	9.4	17	9.34	17.5	0.326	0	288
318	75	16.5	4.4	17	4.15	17	4.22	17	4.2	17	1.3	0.041	318
328	25	16.5	3.9	17	4	17	3.7	17	3.6	17	2.09	0.073	328
338	5	16.5	5.65	17	7	17	6.6	17	6.87	17	0.555	0	338
348	5	16.5	6.35	17	8.7	17	8.51	17.5	8.4	17.5	0.194	0	348
358	5	15	7.55	15.5	8.9	15	8.8	15.5	8.8	15	0.744	0.005	358
368	5	15	8.15	15	9.15	15	9.2	15	9.2	15	1.35	0.005	368
378	3	15	8.2	15	9.05	15	9.05	25.5	9.05	15.5	2.25	0.051	378
388	4	15	8.25	15.5	9.15	15.5	9.1	15.5	9.1	16	1.83	0	388
418	5	16	4.3	16	4.15	16	4	16.5	4.3	16.5	9.26	0.065	418
428	8	15.5	3.65	16	3.5	16	3.5	16.5	3.5	16	5.69	0.032	428
438	5	15.5	5.75	15.5	6.3	16	6.4	16	6.35	16	0.36	0.091	438
448	5	15.5	6.2	16	8.2	16	8.4	16	8.8	16	0	0.005	448
458	5	15	7.15	15.5	8.5	15.5	8.7	16	9	15.5	0	0.005	458
468	5	15	7.85	15.5	9	16	9.05	15.5	9.25	16	1.91	0.081	468
478													478
488													488
518	[illegible]	15	7.9	15	8.2	15.5	7.75	15.5	8.4	15.5	0	0	518
528	[illegible]	15	3.65	15.5	3.55	15.5	3.45	15.5	3.5	15.5	3.84	0.73	528
538	[illegible]	16	4.4	16	4.6	16	4.75	16	5	16	0	0.025	538
548	[illegible]	14.5	5.75	15	8.35	15	8.25	15	8.2	15	0	0.25	548
558	[illegible]	15.5	6.25	16	8.5	16	8.4	16	8.75	16	0	0.005	558
568	[illegible]	14.5	6.8	15	8.35	15	8.35	15	8.4	15	0	0.081	568
578		15	7.05	15.5	8.35	15.5	8.35	15.5	8.4	15	0	0.078	578
588		15	7.25	15.5	8.5	15	8.5	15.5	8.65	15	0	0.045	588

TAKEN AFTER T=10HR